

~~SECRET~~

25X1

PAR 224

8 Sept 64

SUBJECT: 3 - 15X Fluid Gate Enlarger

## TASK/PROBLEM

1. Develop and fabricate an enlarger having continuously variable magnification from 3 to 15X for 70mm square negative gate size. Print sizes to range to 40 x 40 inches on cut sheet stock.

## DISCUSSION

2. Work is proceeding with close correlation to that on PAR 202. Effort this quarter has been on:

a. Vacuum Platen: To explore pressure difference and air volume requirements, a wood and "tempered hardboard" breadboard model with a 40- x 40-inch face was built. A centrifugal blower with a one-hp high-speed motor provided the vacuum. Following is a brief discussion of breadboard testing:

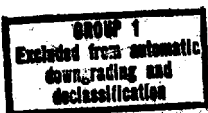
(1) With 1/16-inch diameter holes on one-inch centers over the 40- x 40-inch surface, this blower provided about 0.5 psi vacuum, even with no stock in place. This pressure difference is enough to hold single weight paper print stock or standard base (5.5 mil) film flat and firmly in place. The holding force was increased about threefold by cutting a grid of 1/16- x 1/16-inch grooves with groove intersections at each vacuum hole.

(2) Strongly curled double-weight paper print stock is held to the platen through a central zone of the sheet but with two edges lifted off, due to the "progressive" lifting effect. The two edges may be held down by placing a rigid sheet bordered by a soft gasket to cover a narrow edge of the paper at each of the two lifted edges.

(3) The air pressure and air flow rate requirements were established and a suitable design for the platen face is available.

~~SECRET~~

Declass Review by NGA.



~~SECRET~~

PAR 224

8 Sept 64

(4) Studies of catalog specifications of commercial motor blower units to provide the required air pressure and flow rate have been started.

(5) Studies of structural design and materials for the vacuum platen have been started. No serious problems have been encountered.

b. Negative Transport: The design and fabrication of a mockup of the transport system is nearly complete.

(1) Theoretical design studies on torque motors and commercial electric brakes for the spindles have been made. The model will be built with toothed rubber belt drive from the torque motor to the spindle. Various reduction ratios will be tried in testing the model.

(2) A system of varying the brake torques (by varying the brake coil voltages) in relation to the voltage applied to the torque motors will be tried. The braking of both take-up and supply spindles rather than only the supply spindle may eliminate the necessity of sensing the direction of spindle rotation.

(3) A film driven metering roll mechanism to measure the along-film coordinate is incorporated in the mockup. The mechanism can be driven at high slewing speeds, and has low friction drag.

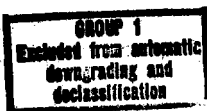
(4) Slides and lead screw drive mechanisms to position the film across its width are incorporated for testing in the mockup.

c. Lens Design:

(1) The contractor's lens design group under [redacted] was authorized early in the quarter to design the family of monochromatic lenses and the associated condenser lenses for this project and PAR 202. The condenser lens designs are complete. Four of the six objective lens designs are complete.

25X1

~~SECRET~~



**SECRET**

PAR 224

8 Sept 64

(2) The same design group was authorized in the last month to proceed with the color corrected objective lens designs. Work on one of the designs has been started. The condenser lenses designed for the monochromatic lenses are expected to be usable with the color corrected lens design.

d. Lens-Platen Focus System: Consideration of the problems of providing precise coupling between the print-stock-platen position and the lens focus setting have led us to recommend a system of independent manual setting of them to calibrated scales correlated by a table of correlated values. The table of correlated values is to be derived by interpolation between a few calibrated points established experimentally for each enlarger and each lens.

#### PLANNED ACTIVITY

3. Effort in the next quarter will be:

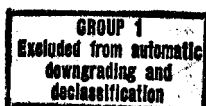
a. Continue the vacuum platen and blower studies and begin design and fabrication of a model which will be useful in testing the lens samples.

b. Completion of the negative transport mock-up and make evaluation tests of it.

c. Provide the mechanical design and begin fabrication of sample monochromatic objective lenses and the corresponding condenser systems.

d. Complete the optical design of the color corrected objective lenses.

e. Begin design and fabrication of a model of the lens-platen focus system. This model will also be useful in the lens sample testing program.



**SECRET**